

RIVER STAGES AND FLOODS FOR JUNE 1948

ELMER R. NELSON

River stages during June were mostly below normal, except in the Northeastern States, the extreme Upper Mississippi and Lower Missouri Basins, and scattered points throughout the country. The greatest negative departure was at Vicksburg, Miss., where the stage of the Mississippi averaged 17.8 feet below normal. Precipitation in the Southern States during the month averaged one-half of normal except in the northwest quadrant, where it averaged up to two times normal. Precipitation over the rest of the country was mostly above normal, except along the Pacific Coast and the northern portion of the North-central and the New England States. It was also below normal over a large area extending southward and westward from the Upper Great Lakes Region.

The Rio Grande at Lobatos Bridge, Colo., exceeded the record crest of 1941 by 1 foot and approached within one-half foot of the record flood of 1932 at Del Rio, Tex. Near-record stages were reached on the Deep Fork Creek in Oklahoma and other smaller streams in Arkansas. The Columbia River receded slowly from its 3d crest at Portland, Oreg., on the 14th to below flood stage on July 3, 43 days after flood stage began on May 22. At Vancouver, Wash., flood stage prevailed from May 19 to July 8. The Marias River reached the highest peak in history at Shelby, Mont., exceeding the previous high of 1907. Several flash floods were reported in the Rocky Mountain States, Texas, and Oklahoma as a result of excessive precipitation.

Atlantic Slope drainage.—Light overflow occurred on the Roanoke at Williamston, N. C., from the 3d to the 6th, due to heavy local rains. No damage was reported.

Missouri Basin.—The Upper Missouri River, which exceeded bank-full stage from Three Forks, Mont., to the Fort Peck Reservoir from June 5–8, caused considerable crop damage and scattered structural and livestock losses. The Sun River flooded the town of Sun River, Mont., and the Sun River portion of Great Falls, Mont., on June 4–6. Flood waters remained in some low places for 2 or 3 weeks. All western Montana streams were near or above capacity flow for about 2 weeks prior to the flooding. Rapid melting of the heavy snow pack in the mountains was caused by the unseasonably warm weather after the middle of May. The stage, therefore, was set for severe flooding with the onset of heavy rains over the basin early in June. Helena, Mont., reported 1.53 inches during the 48-hour period ending on the 4th. Similar heavy rains which occurred over the headwaters where the Missouri forms at Three Forks, in southwestern Montana, caused a crest 2 feet above bank-full stage at Toston, Mont. The crest passed Helena, Mont., around noon on the 5th, and Canyon Ferry, Mont., early on the 7th. The flow at the latter point was the highest in 50 years of record (34,000 cfs.). Numerous rural and urban families were evacuated between Cascade and Sun River, Mont.; at least 50 families were forced out of their homes in the latter community. The flood waters caused the Sun River to cut a new channel about 1½ miles southwest of Sun River, Mont. Approximately 4,000 acres of farm land were cut off.

The Marias River reached the highest peak in history at Shelby, Mont., on June 18 (39,900 cfs.), exceeding the previous high of 29,500 cfs. in 1907. This flood which covered the entire Marias basin was caused by a record-breaking 2-day rainfall which covered about 5,000 square miles.

The storm that produced this record flood began during the night of the 15–16th and ended late in the after-

noon of the 17th, approximately 40 hours later. It resulted from a rather steady east-northeasterly flow of moist, conditionally unstable air up the east slope of the Continental Divide. The rainfall was the heaviest in the west and central portions of Teton and Pondera Counties in western Montana. Approximately 600 square miles received a total of 8 or more inches; 2,500 square miles, 6 or more inches; and over 5,000 square miles, more than 3.5 inches. It was the heaviest 48-hour rainfall on record in the area.

The flood resulting from the rainstorm was very damaging. State and U. S. Highways were closed when bridges were inundated and several bridge approaches washed out. Severe damage resulted to county roads in Pondera County. It has been estimated that it may take 2 years to repair the damaged roads. The Cut Bank-Shelby oil fields were closed down for about 4 days; several wash-outs occurred on the branch lines of the Great Northern Railroad; and considerable damage resulted from flooded basements and to irrigation projects. Crop damage was relatively small due to the late season, but considerable lowland acreage remained under water for several weeks and may not produce any crops this year.

White Basin.—Minor flooding occurred along the White and Black Rivers in Arkansas as a result of the heavy rains over Oklahoma during the last one-third of the month. The inundation of more than 12,000 acres caused considerable damage to crops in the flood plain.

Arkansas Basin.—Considerable flooding occurred in the Arkansas Basin during the latter part of June as a result of widespread heavy thundershowers during the last decade.

A severe flash flood, which caused considerable damage, occurred in the Kingfisher, Okla., area due to extremely heavy rains, reported unofficially as around 20 inches.

The Verdigris River from Claremore to Inola, Okla., exceeded bank-full stage by 8 to 10 feet; the Arkansas from Webbers Falls, Okla., to Van Buren, Ark., by 7 to 8 feet; and the Neosho at Oswego, Kans., by nearly 8 feet. Minor flooding occurred along the lower Arkansas from Ozark to Pine Bluff, Ark.

The severe damage that resulted was due more to the widespread flooding and duration of flooding than to excessively high stages.

The heaviest 24-hour rainfall amounts reported officially were 8 to 10 inches, but unofficial reports of 10 to 15 inches were common.

A tabulation of the average daily rainfall in the various basins during the last decade of June is given in Table 1.

TABLE 1.—Average rainfall (inches) for June 1948

Basins	21	22	23	24	25	26	27	28	29	Total
Cottonwood	1.65	1.00	0.50		1.25	0.10	0.90	0.90	0.20	6.50
Neosho:										
Council Grove, Kans.—										
Erie, Kans.	.95	1.20	.40	.05	1.00	.30	.25	.65	.10	4.90
Erie, Kans.—Grand Lake,										
Okla.	2.10	6.60	.30	.25	.25	1.25	.25	.20	.05	11.75
Below Grand Lake, Okla.	1.30	3.50	2.10	2.00	T	.50	.60	1.00	.15	11.15
Verdigris:										
Above Independence, Kans.	1.00	1.60	.20	T	1.00	.60	.15	.35	.05	4.95
Below Independence,										
Kans.	1.00	4.00	1.00	.50	T	3.50	.50	.50	.10	11.10
Caney	.85	3.75	.25	.10	T	2.50	.50	.50	T	8.45
Bird Creek	.75	4.00	1.00	.05	T	1.50	.50	.50	T	8.30
Cimarron:										
Okeene, Okla.—Perkins,										
Okla.	.75	1.00	3.50	.10	T	.50	.50	1.15	.20	7.70
Perkins, Okla. to Mouth	1.35	3.25	3.00	.25	T	.75	.35	.75	.25	9.95
Arkansas:										
Great Bend, Kans. to										
Arkansas City, Kans.	.75	1.00	.25	T	.80	.80	.85	1.05	.10	5.60
Arkansas City, Kans.—										
Tulsa, Okla.	.50	3.30	1.00	.10	T	1.25	.40	.60	.20	7.35
Tulsa, Okla.—Fort Smith,										
Ark.	.90	.50	1.25	3.00	T	.30	.50	.65	.25	7.35
Little Arkansas	.90	.90	.50		1.10	.75	1.10	1.65	T	6.90

Heavy to excessive rainfall occurred over the North and South Canadian River Basins during the same period.

The first storm passed over the lower portion of the basin in the East-central portion of Oklahoma on the 20th. The heavy rain which continued through the 24th caused sharp rises and flooding in the North and South Canadian and Deep Fork Rivers. The Deep Fork River at Dewar, Okla., approached within $1\frac{1}{2}$ feet of the record stage of 26.67 feet reached in 1945. Additional light to heavy rain occurred again in this area from the 26th to 29th. The total rainfall during the 8-day period in this area ranged from 6 to $15\frac{1}{2}$ inches. Okmulgee, Okla., reported $14\frac{1}{4}$ inches during the first 4 days, and Wetumka and Wewoka, Okla., 11 to 12 inches.

The second storm area was centered over the west-central portion of Oklahoma and extended northeastward from Weatherford to Hennessy. Eleven and one-fourth inches of rain fell at Geary, Okla., between 4:30 p. m. of the 22d and 7:00 a. m. (CST) of the 23d. In the center of the most intense rainfall, estimates based on unofficial measurements indicated the rainfall during the 8- to 12-hour period ranged up to 19 inches or more. Sharp rises occurred on both the North and South Canadian Rivers, with El Reno cresting less than 2 feet below bank-full stage about 24 hours after the passage of the storm. The heavy flow caused considerable flooding of lowlands around Yukon and Oklahoma City on the North Canadian, and from Union City, Okla., to below Whitefield, Okla., on the South Canadian. The previous high stage of 17.75 feet at Whitefield on May 6, 1941, was exceeded by 3 feet. Flash floods on Deer Creek, a tributary of the South Canadian, near Hydro, Okla., trapped several motor vehicles on Highway 66 and drowned 10 persons. A survey of unofficial measurements found that as much as 19 inches of rain fell in this area in 5 hours.

The third storm area was centered over the Panhandle and the extreme northwestern portion of Oklahoma. This storm produced from 1 to nearly 4 inches of rain between the 24th and 27th and caused the North Canadian to exceed bank-full stage by $\frac{1}{2}$ foot at Woodward, Okla.

A flash flood occurred on Boggs Creek, west of Pueblo, Colo., due to a severe rain- and hailstorm during the evening of June 12, 1948. A total of 2.90 inches of rain occurred in less than 3 hours. A family of three was drowned. Most of the damage was to flooded basements in the business district and to windows and electric signs, from hailstones measuring up to $1\frac{1}{4}$ inches in diameter.

West Gulf of Mexico drainage.—The Sabine River crested at bank-full stage at Logansport, La., on the 2d as a result of heavy rains during May. The resulting damage was negligible.

Sharp rises occurred on the Llano and the Pedernales Rivers in Texas, due to heavy rains over the Edwards Plateau. There was some local flooding on the 25th.

A secondary rise occurred in the Upper Rio Grande in New Mexico during the first 10 days of June from snow melt, with crests near those of the first rise of the latter part of May. The secondary rise is usually much less than the primary one and in most cases it does not reach bank-full stage. This season, however, there were unusually heavy snowfalls from Wolf Creek Pass eastward, and also at the higher levels. On the 7th, the Rio Grande crested at a record stage of 7.7 feet at Lobatos Bridge, Colo., 1 foot above the previous high of May 16, 1941; and at Embudo, N. Mex., 1.6 feet below the

previous high of 14 feet of 1941. Rising stages, due to rainfall, continued from the 1st to the 7th at Embudo, merging with the secondary rise and cresting on the 7th at 4 p. m.; and at Otowi Bridge, N. Mex., from the 4th to the 8th, cresting at 8 a. m. on the latter date. The greatest discharge at San Acacia, N. Mex., was 10,500 cfs. on the 10th, and 10,100 cfs. at San Marcial, N. Mex., on the 11th. Although the secondary crests were slightly higher at Lobatos and Embudo, they were slightly lower at Otowi and below, as the El Vado Dam was discharging at half the rate as compared to the first crest. Peak discharges at Del Norte and Monte Vista, N. Mex., were lower during the second crest.

Flash floods occurred on Hondo River at Roswell, N. Mex., on the 2d and 3d due to heavy rains and thunder-showers in the mountains. The first crest reached Roswell about 5 p. m. on the 2d. The lower sections of the city were flooded to depths of 10 to 12 inches. The second crest, which reached Roswell about 11 p. m. on the 3d, flooded the same sections to depths of 1 to 3 feet and covered 215 city blocks. Some residential basements were flooded, and water ran curb deep in the downtown section but was prevented from entering business establishments by the use of sand bags.

A flash flood occurred at Las Vegas, N. Mex., on the night of June 2, as a result of excessive rainfall during a short period. The Las Vegas Airport Station reported 2.40 inches of rain from 5 to 8:30 p. m. on the second. Residents of a lowlands tourist court were evacuated for a short period. The unusually heavy rain caused serious obstruction to the flume supplying water to Peterson Reservoir, damaging and breaking the flume at one point. The most serious result of the flood was the contamination of the water supply. A large volume of muddy water flowed into the Peterson Reservoir as the flood gate on the storm ditch surrounding the lake was lost. The greater portion of the city's population was inoculated against typhoid fever. Considerable damage was done to highways and railroads at Watrous, N. Mex., by heavy rains and flash floods on the small streams in the area.

Flash floods occurred at Carlsbad, N. Mex., on the night of May 31–June 1 and at Artesia, N. Mex., on the night of June 1–2, as a result of excessive precipitation during a short interval. Of the 3.75 inches reported on June 1 at Artesia, 2.75 inches fell in 35 minutes. The total during the 48-hour period ending June 1 was 5.60 inches. Streets, highways, residences, and business establishments in Artesia were flooded to depths of several inches. Residents in the San Jose area near Carlsbad were evacuated.

Torrential rains north and northeast of Del Rio, Tex., on the 24th caused a record rise on Sycamore Creek, 12 miles east of Del Rio, and a near-record rise on the Rio Grande from Del Rio to Laredo, Tex., where it approached within 2 to 4 feet of the record stage of September 1932. The greater portion of the rain fell over an area approximately 30 miles wide and 75 miles long. A survey of unofficial measurements found that rain in excess of 24 inches occurred over a 6- to 12-hour period with a probable average of 15 to 20 inches over most of the area.

Most of the damage was to highways, railroads, utility companies, and ranches along Devil's River and Sycamore and Pinto Creeks. All communication and power service was completely disrupted for several hours. One death was reported in Devil's River.

FLOOD STAGE REPORT FOR JUNE 1948

[All dates in June unless otherwise specified]

River and station	Flood stage	Above flood stages— dates		Crest ¹	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE					
Roanoke: Williamston, N. C.....	Feet 10	3	6	Feet 10.4	5
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Mississippi: Louisiana, Mo.....	12	{ 20 25 29	{ 22 28 (?)	12.1 12.1 12.2	21 26, 27 30
MISSOURI BASIN					
Solomon: Beloit, Kans.....	18	29	30	20.0	29
Republican:		May 30	May 31	6.6 7.7 8.0 14.0 6.6 7.4 8.6	May 30 15 17 21 26 27 28
Cambridge, Nebr.....	5	{ 12	{ 29	10.7 10.6 16.25	24 29 29
Guido Rock, Nebr.....	10	{ 24 27	{ 24 29	10.7 10.6	24 29
Clay: Center, Kans.....	15	28	30	16.25	29
White Basin					
Black: Black Rock, Ark.....	14	19	20	16.0	20
White: Batesville, Ark.....	23	20	21	24.3	20
Arkansas Basin					
Little Arkansas:					
Sedgwick, Kans.....	18	{ 26 28	{ 26 30	18.4 22.7	26 28
Ripley, Kans.....	11	29	30	11.6	29
Minnescah: Peck, Kans.....	17	29	30	18.7	29
Cimarron: Perkins, Okla.....	11	{ 23 28	{ 24 29	13.3 12.8	24 29
Verdigris:					
Independence,	30	{ 22 26	{ 24 27	38.5 33.3	23 26
Coffeyville, Kans.....	20	23	24	22.2	22-23
Claremore, Okla.....	38	23	July 1	46.4	27
Inola, Okla.....	41.5	23	July 3	52.2	28
Neosho:					
Parsons, Kans.....	24	22	23	26.3	22
Oswego, Kans.....	17	22	24	25.6	23
Deep Fork: Dewar, Okla.....	18	22	(?)	25.2	24
North Canadian:					
Woodward, Okla.....	5	28	28	5.6	28
Yukon, Okla.....	11	23	26	17.2	24
East Oklahoma City, Okla.....	14	22	23	14.1	22
Wetumka, Okla.....	14	21	26	22.0	24
Canadian:					
Union, Okla.....	6	23	23	10.0	23
Calvin, Okla.....	15	24	24	15.2	24
Whitefield, Okla.....	16.5	23	26	20.8	24
Arkansas:					
Great Bend, Kans.....	8	30	30	8.4	30
Oxford, Kans.....	14	29	30	14.3	30
Arkansas City, Kans.....	16	27	July 2	18.6	July 1
Webbers Falls, Okla.....	23	23	July 4	30.6	24
Fort Smith, Ark.....	22	24	July 5	29.7	26
Van Buren, Ark.....	22	24	July 5	30.6	26
Ozark, Ark.....	22	25	July 4	25.2	29
Dardanelle, Ark.....	22	25	July 5	27.1	28
Morrilton, Ark.....	30	26	July 5	31.2	28

See footnotes at end of table.

FLOOD STAGE REPORT FOR JUNE 1948—Continued

River and station	Flood stage	Above flood stages— dates		Crest ¹	
		From—	To—	Stage	Date
WEST GULF OF MEXICO DRAINAGE					
Sabine: Logansport, La.....	Feet 25	2	2	Feet 25	July 2
Rio Grande:					
Lobatos Bridge, Colo.....	4	May 19	18	7.3 7.7 6.1 12.3 12.4	May 26 7 13, 14 27 7
Embudo, N. Mex.....	8	May 22	18	8.7 8.8 9.2 4.6 33.5 46.9 45.3	27 8 8 8 24 25 26
Espanola, N. Mex.....	7	May 21	17		
Otowi Bridge, N. Mex.....	9	7	8		
Albuquerque, N. Mex.....	4	3	11		
Del Rio, Tex.....	15	24	25		
Eagle Pass, Tex.....	16	24	26		
Laredo, Tex.....	30	26	27		
GULF OF CALIFORNIA DRAINAGE					
Colorado Basin					
Animas: Durango, Colo.....	4	May 15	21	7.2 6.2	20 4
PACIFIC SLOPE DRAINAGE					
Columbia Basin					
Kootenai:					
Libby, Mont.....	18	May 25	12	19.6	May 28
Bonniers Ferry, Idaho.....	31	May 23	12	35.3	May 29
Flathead:					
Columbia Falls, Mont.....	13.2	May 19	9	19.5	May 23
Somers, Mont.....	93	May 26	21	96.0	6-8
Polson, Mont.....	15.6	May 25	22	21.3	7
Clark Fork: St. Regis, Mont.....	17	May 21	10	20.6	May 24
St. Joe:					
Calder, Idaho.....	87	May 18	4	89.0	May 28
St. Maries, Idaho.....	35	May 19	7	39.2	May 30
Coeur d'Alene:					
Cataldo, Idaho.....	40	May 8		42.6	May 25, 26
Coeur d'Alene Lake, Idaho.....	30	May 1	16	36.0	May 30
Spokane: Spokane, Wash.....	27	May 23	7	28.3	May 30, 31
Willamette: Portland, Oreg.....	18	May 22	July 3	29.95 29.7 30.0 32.5 32.6 21.2 15.0 23.0	1 6 14 May 29 4 May 29 8 May 29
Salmon: White Bird, Idaho.....		May 28	May 30		
Clearwater:					
Kamiah, Idaho.....	14	May 20	10		
Spalding, Idaho.....		May 28	May 29		
Columbia:					
Boundary, Wash.....	32	May 27	30	45.0	11-12
Trinidad, Wash.....		May 21	July 11	56.9 59.4 30.5	May 30 12 May 30-
Umatilla, Oreg.....	25	May 27	21	29.7 34.6 33.7 51.8 50.8 30.2 30.0 30.2	11 May 31 12 May 31 12 6 13, 14
Celilo, Oreg.....		May 22	July 2		
The Dalles, Oreg.....		May 22			
Vancouver, Wash.....	15	May 19	July 8		

¹ Provisional.² Overflow due to operation of dam.³ Continued at end of month.